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Malaria Prevalence in Gusau Township, Nigeria (A Preliminary Report)

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ABSTRACT

This is comprehensive study of malaria and malaria infection in Gusau Township to generate baseline line information which may be useful in the planning control and preventive measures. A total of 5666 blood samples from patients were examined for malaria parasites between the month January to December, 2017, out which 2606 representing 46.0% were positive for malaria parasites, which was high. Both males and females were equally infected at the same rates and between the age groups. Malaria was hyperendemic in Gusau Township with transmission occurring throughout the months of the year. The best way to prevent malaria is avoiding mosquito bite through the use mosquito nets and screening of windows and doors.

Keywords: Malaria; Prevalence; Hyperendemic and Gusau Township

1.0 INTRODUCTION

Malaria is a mosquito-borne disease caused by a parasite. People with malaria often experience fever, chills, and flu-like illness. Left untreated, they may develop severe complications and die. In 2018 an estimated 228 million cases of malaria occurred worldwide and 405,000 people died, mostly children in the African Region (CDC, 2020).

This comprehensive study of the prevalence of malaria in Gusau metropolis as the information gathered would help the relevant organs of government in making a tailor-made planning on

malaria control preventive measures for the community.

2.0 MATERIALS AND METHODS

2.1 Study Area

The study area was Gusau Township, which is the capital city of Zamfara State and Headquarters of Gusau Local Government Area Council. **Gusau** is a city and Local Government Area located in northwestern Nigeria. It is the capital of State. The LGA has an area of 3,364 km² and a population of 383,162 at the 2006 census (NPC, 2006).



Figure 1: Map of Nigeria showing Zamfara State (Maps, 2020)



Figure 2: Map of Zamfara State showing the study area, Gusau LGA (Maps, 2020)

2.2 Study population and study design

This is a prospective cross sectional study of patients attending the laboratories of Federal Medical Centre, Ahmad Yariman Bakura Specialist Hospital, King Fahd Hospital and Farida Hospital, a Primary Health Centre and Diagnostic Laboratory all located within Gusau metropolis, Nigeria. Participants were well informed on the purpose of the study and they consented and participated.

2.3 Sample size, study design and sample collection

The sample size of 384 was determined according to Cochran, (1999) and Abdullahi *et al*, (2009), using the formula:

$$n = (z^2 p q) / d^2$$

where n = minimum sample size, z = standard normal deviation and probability i.e. 0.05 at 95% confidence limits, p = prevalence or proportion of value to be estimated from previous studies, q = 1 – p, and d = tolerance limit, the minimum is 0.05.

2.4 Blood Sample Collection

A total of 5,666 blood samples were collected between the months of January and December, 2017. Blood samples were randomly collected

weekly from patients attending laboratories of the six study sites mentioned earlier. Capillary blood from the thumb or venous blood from the cubital vein of the participants were taken by technical in charge into EDTA collection tubes. Thick and thin blood smears were prepared on the slide and fixed absolute methanol and stained with Giemsa stain in a standard procedure described by Cheesbrough, 2009 and WHO, 2015. The slides were observed under light microscope (Olympus®) at x 100 magnification (i.e. oil immersion). A slide was recorded as positive if it contained any of the stages of the malaria parasites and were recorded accordingly. The parasite species were duly identified. A slide was considered to be negative after viewing 100 microscopic fields without seeing any malaria parasite. For quality assurance all positive slides were later viewed separately and independently by experienced microscopist (WHO, 2015).

2.5 Ethical Approval

This research got approval from the Ethical Committees of the Ministry of Health, Federal Medical Centre and Ahmad Yariman Bakura Specialist Hospital, Gusau, Nigeria.

3.0 STATISTICAL ANALYSIS

All data collected were carefully documented and checked to ensure correctness of entries, were represented in percentages and later carefully entered into an SPSS (statistical package for social sciences) SPSS software version 13.0 (SPSS Inc. Illinois, USA, 2004) for further analysis.

4.0 RESULTS

The results of this one-year malaria studies in Zamfara Township revealed that the prevalence was 2607/5666 represented 46.0%. The month of August recorded the highest infection rate of 313/462 (67.7%), followed by July 300/477 (62.9%) and October, 247/419 (58.9%). The month of May recorded the least infection rate 158/490 (30.5%) followed by the months April 151/470 (32.1%) and March 158/490 (32.2%) as represented in table 1.

Table 1: Monthly malaria prevalence in Gusau Township between January to December, 2017

MONTH	NE: No. Examined	NI: No. Infected	Percentage (%)	P value	
JAN	473	159	33.6 ^a	<i>a. 0.068</i>	
FEB	482	150	31.1 ^a		
MAR	490	158	32.2 ^a		
APR	470	151	32.1 ^a		
MAY	486	148	30.5 ^a		
JUN	490	282	57.6 ^a		
JUL	477	300	62.9 ^b		<i>b. 0.032</i>
AUG	462	313	67.7 ^b		
SEP	484	267	55.2 ^b		
OCT	419	247	58.9 ^b		
NOV	477	229	50.2 ^b		
DEC	456	203	44.5 ^a		
TOTAL	5666	2607	46.0 ^c	<i>c. 0.025</i>	

There was significant difference between the superscript values a, b and c

The result of annual prevalence according gender indicated that the male had 1373/2964 (46.3%) and female had 1234/2702 (45.7%) infections. The highest monthly infection rates in male were in the months of August (71.9%), October (62.6%) and July (62.3%) and the least infection

rates were in the months of March (31.5%), February (32.9%) and January (32.2%) respectively. The highest monthly infection rates in female were July (63.6%), August (62.7%), June and October with (54.8%) each respectively. The least infection in the females were seen in the months in February (29.1%), April (30.3%) and January (31.8%) respectively as seen in table 2.

Table 2: Malaria prevalence in Gusau Township according gender between January to December, 2017

MONTH	GENDER						
	Male			Female			
	NE	NI	%	NE	NI	%	p value
Jan	250	88	32.2	223	71	31.8	<i>0.061*</i>
Feb	252	83	32.9	230	67	29.1	
Mar	251	79	31.5	239	79	33.1	
Apr	249	84	33.5	221	67	30.3	
May	250	72	28.8	236	76	32.2	
Jun	251	151	60.2	239	131	54.8	

Jul	252	157	62.3	225	143	63.6
Aug	253	182	71.9	209	131	62.7
Sep	243	134	55.1	241	133	55.2
Oct	222	139	62.6	197	108	54.8
Nov	246	108	43.9	231	121	52.4
Dec	245	96	39.2	211	107	50.7
TOTAL	2964	1373	46.3	2702	1234	45.7

*The annual malaria prevalence between males and females was statistically **not** significant

KEYS: NE = NUMBER EXAMINED; NI = NUMBER INFECTED

Out of the 2666 positive malaria samples identified, 2389/2666 (91.6%) were *Plasmodium falciparum*, 197/2666 (7.6%) were *Plasmodium*

malariae and 21 samples could not be identified as seen in table 3.

Table 3: Malaria species identified in Gusau Township between January to December, 2017

N = 2607		
<i>Plasmodium falciparum</i> 2389(91.6%)	<i>Plasmodium malariae</i> 197(7.6%)	<i>Un-identified species</i> 21(0.80%)

The annual malaria prevalence according to age showed the highest infection rates were observed in the ages < 1year with 229/425 (53.9%), 1 -10 years with 367/720 (51.0%) and 11 – 20 years having 487/958 (50.8%). Whereas the least annual malaria prevalence were observed in the ages 31 – 40 years with 507/1251 (40.5%), 337/786 (42.9%) and 535/1220 (43.9%) respectively, as presented in table 4

Table 4: Malaria prevalence in Gusau township according month and age between January to December, 2017

AGE/YEARS																						
MONTH	<1			1-10			11-20			21-30			31-40			41-50			+50			<i>p value</i>
	NE	NI	%	NE	NI	%	NE	NI	%	NE	NI	%	NE	NI	%	NE	NI	%	NE	NI	%	
JAN	35	18	51.4	51	25	49.0	73	33	45.2	97	24	24.7	101	27	26.7	89	17	19.1	27	15	55.6	
FEB	31	16	51.6	57	19	33.3	77	37	48.1	100	38	38.0	111	17	15.3	91	16	17.6	15	7	46.7	
MAR	40	11	27.5	65	22	33.8	81	36	44.4	110	37	33.6	123	31	18.7	61	15	23.1	10	10	100.0	
APR	33	15	42.9	63	24	38.1	68	29	42.6	99	32	32.3	105	25	23.8	67	16	23.9	35	10	28.6	
MAY	44	19	43.9	65	27	41.5	85	21	24.7	123	39	31.7	99	27	27.3	57	12	21.1	13	3	23.1	
JUN	49	33	67.3	55	41	74.5	71	45	63.4	109	49	45.0	117	59	50.4	66	39	59.1	23	16	69.6	
JUL	22	15	68.2	49	35	71.5	113	65	57.5	96	56	58.3	107	67	62.6	59	41	69.5	31	21	67.7	
AUG	30	22	73.3	69	47	68.1	79	59	74.7	88	55	62.5	100	67	67.0	71	47	66.2	25	16	64.0	
SEP	34	25	73.5	55	31	56.4	83	47	56.6	111	61	55.0	87	44	50.6	67	38	56.7	47	21	44.7	
OCT	32	18	56.3	66	37	56.1	74	41	56.4	89	59	66.3	82	45	54.9	65	40	61.5	11	7	63.6	
NOV	39	21	53.8	67	32	51.6	79	41	51.9	103	44	42.7	110	52	47.3	48	29	60.4	31	10	32.3	
DEC	36	16	44.4	58	27	46.6	75	33	44.0	95	41	43.2	109	46	42.2	45	27	60.0	38	13	34.2	
TOTAL	425	229	53.9	720	367	51.0	958	487	50.8	1220	535	43.9	1251	507	40.5	786	337	42.9	306	153	48.7	<i>0.075*</i>

*The annual malaria prevalence between the age groups was statistically not significant

KEYS: NE = NUMBER EXAMINED; NI = NUMBER INFECTED

5.0 DISCUSSION

The overall annual prevalence of malaria in Gusau Township between the months January to December, 2017 was 46.0%, which was higher than Abdullahi *et al.* (2009) and *Plasmodium falciparum* species was the dominant species identified. The degree of infection between the highest (month of August) and the least (month of February) was statistically significant ($p = 0.032$). There was no significant difference between the prevalence of infection between males and females ($p = 0.061$) and between the age groups ($p = 0.075$).

Malaria was hyperendemic in Gusau Township as transmission occurs through the months of the year in a considerable high proportion, which may be attributable to the conducive weather conditions which promotes the breeding of the mosquito vectors. The other factor contributing to the hyperendemicity is the human behaviour on preventive and control measures, which facilitate the easy access of mosquitoes to humans.

6.0 CONCLUSION

Malaria prevalence in Gusau township was high (46.0%) and was hyperendemic with transmission throughout the months of the year. The infection was mostly *Plasmodium falciparum* and it affected both sexes and all ages throughout the months of the year.

7.0 RECOMMENDATION

The best method of preventing malaria is to avoid mosquito bites by using mosquito nets, screening of windows and doors. It would also be recommended that malaria diagnosis should encouraged before taking any antimalarial drugs.

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